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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	)	
	)	
RICHARD R. DICKSON et al.	)	Art Unit: 2856
	)	
Application No. 10/692,871	)	Examiner: Nashmiya Saqib Fayyaz
	)	
Filed: October 24, 2003	)	
	)	
For: EXHAUST GAS PARTICULATE MEASURING SYSTEM	)	
	)	
Attorney Docket No. 00-714.1	)	

Peoria, Illinois 61629-6490
November 18, 2005

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

BRIEF ON APPEAL

Sir:

This is an appeal under 37 CFR § 41.37 to the Board of Patent Appeals and Interferences of the United States Patent and Trademark Office from the final rejection of Claims 14-25, 27-44 and 46-52 of the above-identified patent application. These claims were indicated as finally rejected in an Office Action dated May 26, 2005. Attached herewith is a fee transmittal sheet authorizing payment of the $500.00 fee required under 37 CFR § 41.20 (b)(2).

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(I) REAL PARTY OF INTEREST

Caterpillar Inc. of Peoria, Illinois is the assignee of the patent application and the real party of interest.

(II) RELATED APPEALS AND INTERFERENCES

A notice of appeal was filed on August 19, 2005 for the present divisional application serial no. 10/692,871. The present divisional application was the result of a restriction requirement that occurred during the prosecution of the parent serial no. 09/905,698, which is also under appeal (brief submitted on November 16, 2005).

(III) STATUS OF CLAIMS

Claims 14 - 25, 27 - 44 and 46 - 52 are pending in the application.

Claims 14 - 24, 27, 29 - 44, 46 and 48 - 52 are rejected under 35 USC §103 (a) as being unpatentable over Hendren US Patent Publication 2003/0136177 and are being appealed.

Claims 25, 28 and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

These claims are shown in the Appendix attached to this Appeal Brief.

(IV) STATUS OF AMENDMENTS

Appellants filed a Response on July 13, 2005 after the Final Office Action mailed May 26, 2005. An Advisory Action mailed on August 9, 2005 stated that the aforementioned Response with the proposed amendment to the claims with the insertion of "non-collinearly" presents a new combination for the claims that raises new issues requiring further search and/or consideration. For purposes of appeal the amendment will not be entered.

(V) SUMMARY OF CLAIMED SUBJECT MATTER

Independent Claim 14 – Reference to Specification by page, line number and Figs.

Independent claim 14 specifically claims a gas sampling system for measuring particulate matter in the exhaust gas flow of an internal combustion engine by using a partial flow dilution tunnel and specifically claims, in combination with other elements of the system, a transient dilution air control arrangement for controlling the dilution air to the partial flow dilution tunnel as set forth in the entire specification and Fig. 1. Specifically the dilution control arrangement is set forth in Fig. 3 and as set forth below.

14. A gas sampling system **Page 4 paragraph 16 lines 1-3 and 7-9 Fig 1 and 2 (element 36)** for measuring particulate matter in an exhaust gas stream **Page 4 paragraph 16 line 10 Fig 1 (element 40)** of an internal combustion engine **Page 3 paragraph 13 line 4 Fig 1 (element 16)** comprising:

a partial flow dilution tunnel **Page 4 paragraph 16 line 2 Figs 1and 2 (element 38)** connected to the exhaust gas stream **Page 4 paragraph 16 line 10 Fig 1 (element 40)** of the engine **Page 3 paragraph 13 line 4 Fig 1 (element 16)**;

a first mass flow controller **Page 5 paragraph 17 lines 3-6 and 10-11 Fig 2 (element 60)** operatively connected an inlet of said partial flow dilution tunnel **Page 5 paragraph 17 line 1 Figs 1 and 2 (elements 50 and 38)**;

a second mass flow controller **Page 6 paragraph 18 lines 4-9 Fig 2 (element 80)**; connected to an outlet end of said partial flow dilution tunnel **Page 6 paragraph 18 line 1 Figs 1 and 2 (element 38)**;

a filter interposed said second mass flow controller and the outlet end of said partial flow dilution tunnel **Page 6 paragraph 18 line 1-5 Figs 1 and 2 (element 70)**; and

a transient dilution air control arrangement **Page 6 paragraph 19 line 2 Figs 1-3 (element 110)** being interposed the first mass flow controller and the inlet of said partial flow dilution tunnel, said transient dilution air control arrangement includes a constant mass flow stream **Page 6 paragraph 19 starting at line 4 to the end of the paragraph and Fig 3**

(element 112) and a variable mass flow stream **Page 7 paragraph 20 and Fig 3 (element 114)** non-collinearly connected with said constant mass flow stream prior to the inlet of the partial flow dilution tunnel for controlling a dilution air supply to said partial flow dilution tunnel **Pages 6 and 7 paragraphs 19 and 20, Fig 3, and paragraph 25 starting at the end of line 7 through the end of paragraph 26.**

Independent claim 34 specifically claims a gas sampling system for measuring particulate matter in the exhaust gas flow of an internal combustion engine by using a partial flow dilution tunnel and specifically claims, in combination with other elements of the system, a means control arrangement for controlling the dilution air to the partial flow dilution tunnel as set forth in the entire specification and Fig. 1. Specifically the means is set forth in Fig. 3 and as set forth below.

34. A gas sampling system **Page 4 paragraph 16 lines 1-3 and 7-9 Fig 1 and 2 (element 36)** for measuring particulate matter in an exhaust gas stream **Page 4 paragraph 16 line 10 Fig 1 (element 40)** of an internal combustion engine **Page 3 paragraph 13 line 4 Fig 1 (element 16)** comprising:

a partial flow dilution tunnel **Page 4 paragraph 16 line 2 Figs 1and 2 (element 38)** connected to the exhaust gas stream **Page 4 paragraph 16 line 10 Fig 1 (element 40)** of the engine **Page 3 paragraph 13 line 4 Fig 1 (element 16)**;

a first mass flow controller **Page 5 paragraph 17 lines 3-6 and 10-11 Fig 2 (element 60)** operatively connected an inlet of said partial flow dilution tunnel **Page 5 paragraph 17 line 1 Figs 1 and 2 (elements 50 and 38)**;

a second mass flow controller **Page 6 paragraph 18 lines 4-9 Fig 2 (element 80)**; connected to an outlet end of said partial flow dilution tunnel **Page 6 paragraph 18 line 1 Figs 1 and 2 (element 38)**;

a filter interposed said second mass flow controller and the outlet end of said partial flow dilution tunnel **Page 6 paragraph 18 line 1-5 Figs 1 and 2 (element 70)**; and

means for controlling dilution air to said partial flow dilution tunnel **Page 6 paragraph 19 line 2 Figs 1-3 (element 110)**, said means being interposed the first mass flow

controller and the inlet of said partial flow dilution tunnel, said means includes a constant mass flow stream **Page 6 paragraph 19 starting at line 4 to the end of the paragraph and Fig 3 (element 112)** and a variable mass flow stream **Page 7 paragraph 20 and Fig 3 (element 114)** non-collinearly connected with said constant mass flow stream prior to the inlet of the partial flow dilution tunnel. **Pages 6 and 7 paragraphs 19 and 20, Fig 3, and paragraph 25 starting at the end of line 7 through the end of paragraph 26**

(VI) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issue at hand is whether Claims 14 - 24, 27, 29 - 44, 46 and 48 - 52 should be rejected and held unpatentable under 35 U.S.C. § 103 (a) as being unpatentable over Hendren US Patent Publication 2003/0136177, specifically independent claims 14 and 34.

(VII) ARGUMENT

Discussion re: Patentability of Independent Claim 14 and 34

The Examiner rejected claims 14 and 34 in an office action dated May 26, 2005 under 35 U.S.C. § 103 (a) as being unpatentable over Hendren US Patent Publication 2003/0136177. On page 2 of the Official Action the Examiner presented the following argument:

The Examiner has rejected claims 1 and 9 under 35 U.S.C. § 103 (a) as being unpatentable over Hendren US Patent Publication 2003/0136177. As to claim 14 and 34, Hendren et al. disclose an emission sampling apparatus including a dilution tunnel 20 with inlet 17 with a sampling system 70, 72, 74 exhaust 11 of engine 12, flow control valve 28, second mass flow controller 36, filter 34 with a dilution air control valve 28, second mass flow controller 36, filter 34 with a dilution air control arrangement 42/50 having a constant mass stream exiting via fixed flow rate pump 29 and a variable flow stream "connected with" the constant stream via variably controlled solenoid valve 28 which provides a variable flow stream "prior to the inlet of the partial flow dilution tunnel", see figs 1-2. Further, it is noted that a mass flow controller, per se is not designated by Hendren et al. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have

designated the computer controlled solenoid valve 28 as a mass flow controller as it performs the function of controlling the flowrate, as in a "mass flow controller".

Applicants have amended claims 14 and 34 to more positively set forth, that which is regarded as the invention as stated above. Specifically, these claims have been amended by including that the variable mass flow stream is non-collinearly connected with the constant mass flow stream prior to the inlet of the dilution tunnel. The non-collinear connection of a variable mass flow stream and a constant mass flow stream is not taught or suggested in the Hendren reference. The Hendren reference teaches that dilution air is provided by a fixed flow rate pump 29 and the flow therefrom is controlled by a proportional solenoid valve 28. One skilled in the art would readily recognize that the proportional valve 28 creates a backpressure in the line from the fixed flow rate pump 29. This backpressure therefore causes the flow rate out of the pump 29 to be the same as the flow rate coming from proportional valve 28. Thus, what Hendren teaches is one stream of dilution air and that the quantity of dilution air being controlled by the proportional solenoid valve 28 and nothing more. Applicants remind the Examiner that MPEP § 2143 Mandates the three criteria that must be met to provide a prima facia case for obviousness:

> "...three basic criteria must be met. First, there must be some motivation, either in the references themselves or in knowledge generally available to one of ordinary skill in the art, to modify the references or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all of the claimed limitations."

Specifically, as now claimed in independent claims 14 and 34 the transient dilution air control arrangement controls dilution airflow by way of a variable mass flow stream that is non-collinearly connected with a constant mass flow stream prior to the inlet of the dilution tunnel. Therefore there is no motivation for controlling the dilution air flow by connecting a constant flow stream with a variable flow stream as is presently claimed in claims 14 and 34. Furthermore, the teachings of the Hendren reference are different from the teachings of the present invention by stating the dilution airflow is controlled in an inverse proportion to the ratio of intake air flow and the engine intake air flow at idle and therefore cannot provide a

reasonable expectation of success. Lastly, the Hendren reference does not teach or suggest the features of claims 14 and 34. Applicants therefore contend that claims 15-24 and 27 and claims 35-44 and 46 add additional features to claims 14 and 34 from which they respectively depend, which are believed to be in condition for allowance and respectfully requests reconsideration and withdrawal of the rejection under 35 USC §103 (a) of claims 14-24, 27, 24-44, and 46.

In conclusion, Applicant contends that the Hendren reference does not teach or even suggest that which is set forth in independent claims 14 and 34 to provide a prima facia case for obviousness under 35 U.S.C. § 103 (a) and secondly that the latest amendment presented for claims 14 and 34 do not add new material that would require further search and consideration. As these points were presented in the response in the reply dated July 13, 2005.

Lastly, Applicants are perplexed by the Examiners erroneous rejections throughout the prosecution of this divisional application and the parent application. For instance, the Examiners restricting the original application into two distinct and independent inventions, claim sets 1-13 (present application under appeal serial no. 09/905,698) and 14-52 (pending application serial no. 10/692,871), and then rejecting both applications under the judicially created doctrine of obviousness-type double patenting.

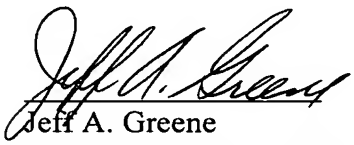
Lastly Discussion re: Patentability of Claims 15 - 24, 27, 29 - 30, 35 - 44, 46 and 48 - 52

Each of Claims 15 - 24, 27, 29 - 30, 35 - 44, 46 and 48 - 52 each add additional limitations to Claims 14 and 34, respectively and include the limitations of these base claims from which they depend. Therefore, Claims 15 - 24, 27, 29 - 30, 35 - 44, 46 and 48 - 52 are allowable for the reasons hereinbefore discussed with regard to Claim 14 and 34.

Claims 15 - 24, 27, 29 - 30, 35 - 44, 46 and 48 - 52 are patentable over the Examiner's rejection under 35 U.S.C. § 103 (a) over Hendren US Patent Publication

2003/0136177. Accordingly, the Board of Appeals is respectfully requested to reverse the rejection of the aforementioned claims.

Respectfully submitted,



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(VIII) CLAIMS APPENDIX

Claims

14. A gas sampling system for measuring particulate matter in an exhaust gas stream of an internal combustion engine comprising:

a partial flow dilution tunnel connected to the exhaust gas stream of the engine;

a first mass flow controller operatively connected an inlet of said partial flow dilution tunnel;

a second mass flow controller connected to an outlet end of said partial flow dilution tunnel;

a filter interposed said second mass flow controller and the outlet end of said partial flow dilution tunnel; and

a transient dilution air control arrangement being interposed the first mass flow controller and the inlet of said partial flow dilution tunnel, said transient dilution air control arrangement includes a constant mass flow stream and a variable mass flow stream non-collinearly connected with said constant mass flow stream prior to the inlet of the partial flow dilution tunnel for controlling a dilution air supply to said partial flow dilution tunnel.

15. The gas sampling system of claim 14, wherein said second mass flow controller is a master controller and the first mass controller is a slave controller.

16. The gas sampling system of claim 14, wherein said transient dilution air control arrangement is positioned in close proximity to said partial flow dilution tunnel.

17. The gas sampling system of claim 14, including a sampling probe being positioned in the exhaust gas stream and the partial flow dilution tunnel.

18. The gas sampling system of claim 14, including a supply of scrubbed and filtered air being connected to said first mass controller.

19. The gas sampling system of claim 14, including a flow measuring device adapted to measure a flow of intake air, said flow measuring device being positioned in a conduit of an air intake of the engine.

20. The gas sampling system of claim 19, wherein said flow measuring device being a laminar flow element is connected to a pressure differential transducer.

21. The gas sampling system of claim 20, wherein said pressure differential transducer is connected to a selectable gain circuit.

22. The gas sampling system of claim 21, wherein said selectable gain circuit is switchable to handle one of a single channel input and a multiple channel input.

23. The gas sampling system of claim 21, wherein said selectable gain circuit is selectable between a plurality of course settings.

24. The gas sampling system of claim 14, including a vacuum pump connected to said second mass flow controller.

25. The gas sampling system of claim 14, including a solenoid valve connected in parallel with the partial flow dilution tunnel between said first mass flow controller and said partial flow dilution tunnel inlet and said partial flow dilution tunnel outlet and said second mass flow controller.

26. (Cancelled)

27. The gas sampling system of claim 14, wherein said constant mass flow stream includes a pressure regulating valve serially connected with a critical flow venturi.

28. The gas sampling system of claim 14, wherein said variable mass flow stream is connected in parallel with said constant mass flow stream.

29. The gas sampling system of claim 14, wherein said variable mass flow stream includes a first pressure regulating valve serially connected with a dome loaded regulating valve and a mass flow transducer.

30. The gas sampling system of claim 29, including a pressure regulating valve serially connected to a voltage to pressure controller.

31. The gas sampling system of claim 30, wherein said voltage to pressure controller is connected to and receives electrical inputs from a flow measuring device and said mass flow transducer, said flow measuring device being adapted to measure a flow of intake air to the engine.

32. The gas sampling system of claim 31, wherein said voltage to pressure controller is connected to and sends pressure signals to said dome loaded pressure regulating valve.

33. The gas sampling system of claim 32, wherein an output from said dome loaded pressure regulating valve and a critical flow venturi and supply dilution air to said partial flow dilution tunnel.

34. A gas sampling system for measuring particulate matter in an exhaust gas stream of an internal combustion engine comprising:

a partial flow dilution tunnel connected to the exhaust gas stream of the engine;

a first mass flow controller operatively connected an inlet of said partial flow dilution tunnel;

a second mass flow controller connected to an outlet end of said partial flow dilution tunnel;

a filter interposed said second mass flow controller and the outlet end of said partial flow dilution tunnel; and

means for controlling dilution air to said partial flow dilution tunnel, said means being interposed the first mass flow controller and the inlet of said partial flow dilution tunnel, said means includes a constant mass flow stream and a variable mass flow stream non-collinearly connected with said constant mass flow stream prior to the inlet of the partial flow dilution tunnel.

35. The gas sampling system of claim 34, wherein said second mass flow controller is a master controller and the first mass controller is a slave controller.

36. The gas sampling system of claim 34, including a sampling probe being positioned in the exhaust gas stream and the partial flow dilution tunnel.

37. The gas sampling system of claim 36, wherein said sampling probe is a square root extractor.

38. The gas sampling system of claim 34, including a supply of scrubbed and filtered air being connected to said first mass controller.

39. The gas sampling system of claim 34, including a flow measuring device connected to said means for controlling dilution air, said flow measuring device being adapted to measure a flow of intake air, said flow measuring device being positioned in a conduit of an air intake of the engine.

40. The gas sampling system of claim 39, wherein said flow measuring device is a laminar flow element.

41. The gas sampling system of claim 39, wherein said laminar flow element is connected to a pressure differential transducer.

42. The gas sampling system of claim 41, wherein said pressure differential transducer is connected to a selectable gain circuit.

43. The gas sampling system of claim 42, wherein said selectable gain circuit is switchable to handle one of a single channel input and a multiple channel input.

44. The gas sampling system of claim 34, wherein said selectable gain circuit includes a selectable gain switch being selectable between a plurality of coarse voltage positions.

45. (Cancelled)

46. The gas sampling system of claim 34, wherein said constant mass flow stream includes a pressure regulating valve serially connected with a critical flow venturi.

47. The gas sampling system of claim 34, wherein said variable mass flow stream is connected in parallel with said constant mass flow stream.

48. The gas sampling system of claim 34, wherein said variable mass flow stream includes a first pressure regulating valve serially connected with a dome loaded regulating valve and a mass flow transducer.

49. The gas sampling system of claim 48, including a pressure regulating valve serially connected to a voltage to pressure controller.

50. The gas sampling system of claim 48, wherein said voltage to pressure controller is connected to and receives electrical inputs from a flow measuring device and

said mass flow transducer, said flow measuring device being adapted to measure the flow of intake air to the engine.

51. The gas sampling system of claim 50, wherein said voltage to pressure controller is connected to and sends pressure signals to said dome loaded pressure regulating valve.

52. The gas sampling system of claim 51, wherein an output from said dome loaded pressure regulating valve and a critical flow venturi supply dilution air to said partial flow dilution tunnel.

(IX) EVIDENCE APPENDIX -None-

(X) RELATED PROCEEDINGS APPENDIX –None-